Unilateral Policy Design against Carbon Leakage

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What is carbon leakage?

- **Climate policy in one (group of) country may lead to increased emissions in other countries = Leakage**
  - Leakage rate:
  - How much??

$$\frac{\Delta(\text{Foreign emissions})}{-\Delta(\text{Domestic emissions})}100\%$$

- **Reduced climate benefit of climate policy**
- **Two main channels for leakage**
  - **Energy Market**
  - **Emission Intensive and Trade Exposed (EITE)**

Focusing on the Emission Intensive and Trade Exposed

- **Unilateral action -> carbon leakage***(a result of other countries soft climate regulations)*

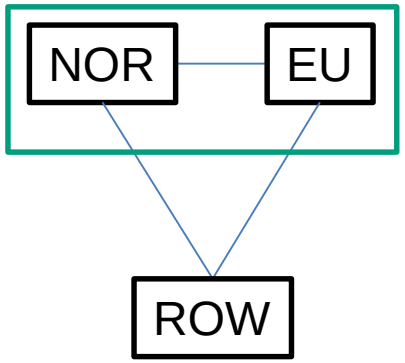
- **How to mitigate the carbon leakage in EITE sector?**
  - Output-based allocation (OBA) -> (Allocation of free quotas linked to output)

- **A quota market with Output-Based Allocation (OBA)**
  - (Böhringer and Lange, 2005): OBA reduces leakage, but stimulates domestic production and acts as an implicit production subsidy
  - EU ETS: practicing free allocation of emission allowances for several years

Quota Market with Output-Based Allocation(OBA)

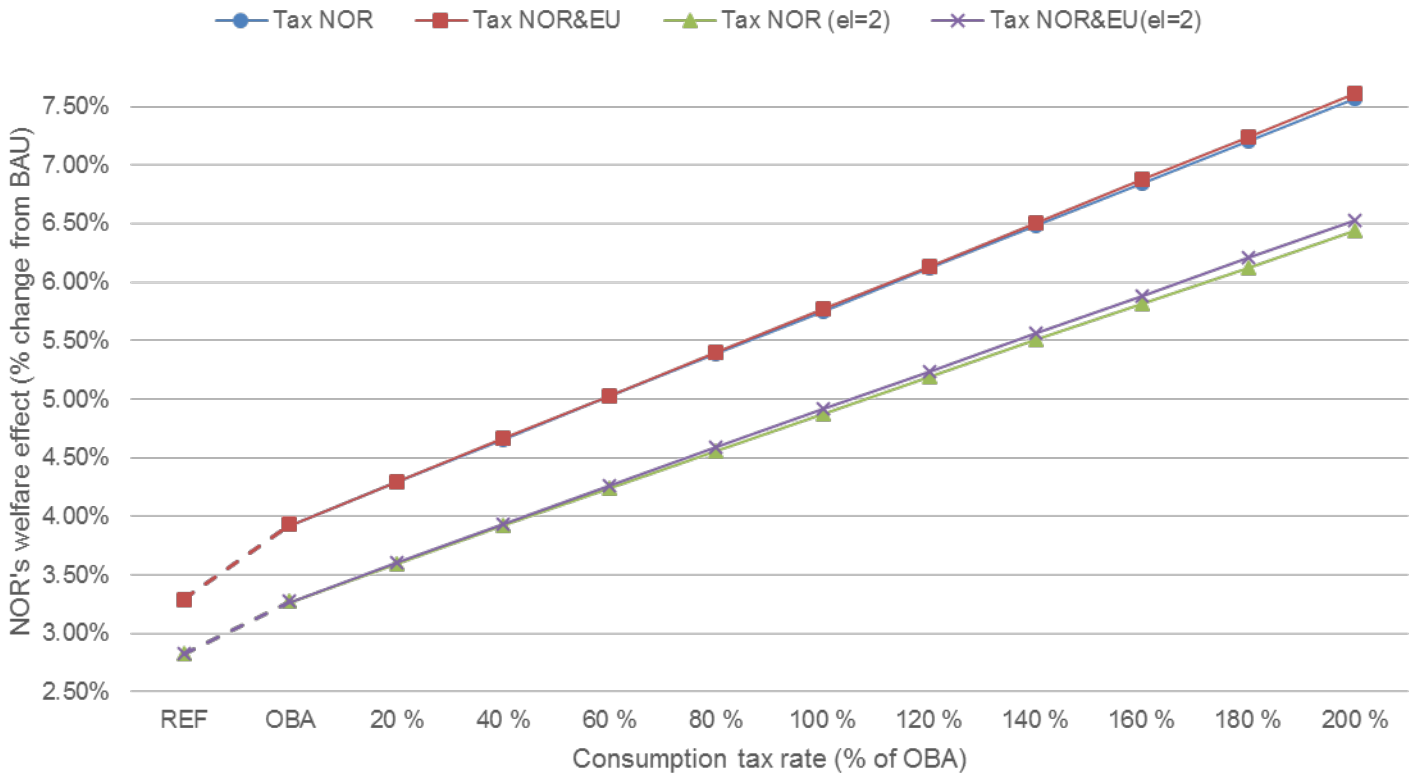
- **In this paper:**
  - A subset of countries involved in this quota system may want to increase their effort to reduce carbon emissions
  - examine the welfare effects of introducing a consumption tax on all use of EITE goods in a situation where a quota system has already been implemented, together with OBA on the EITE goods.
  - There are papers examining consumption tax in environmental regulation
    - However, we look at multiple goods in an multi-sector and multi-region economy, with a subset of countries involved in the quota market
    - Paper builds on the basic model and findings in Böhringer et al. (2017)
  - **The motivation:** current situation in Europe
    - Where the EU/EEA countries have set quite ambitious climate targets
    - EU institutions have responded enthusiastically to the Paris Climate Agreement outcome
    - However, significant political tension and different interests among the member states

Model



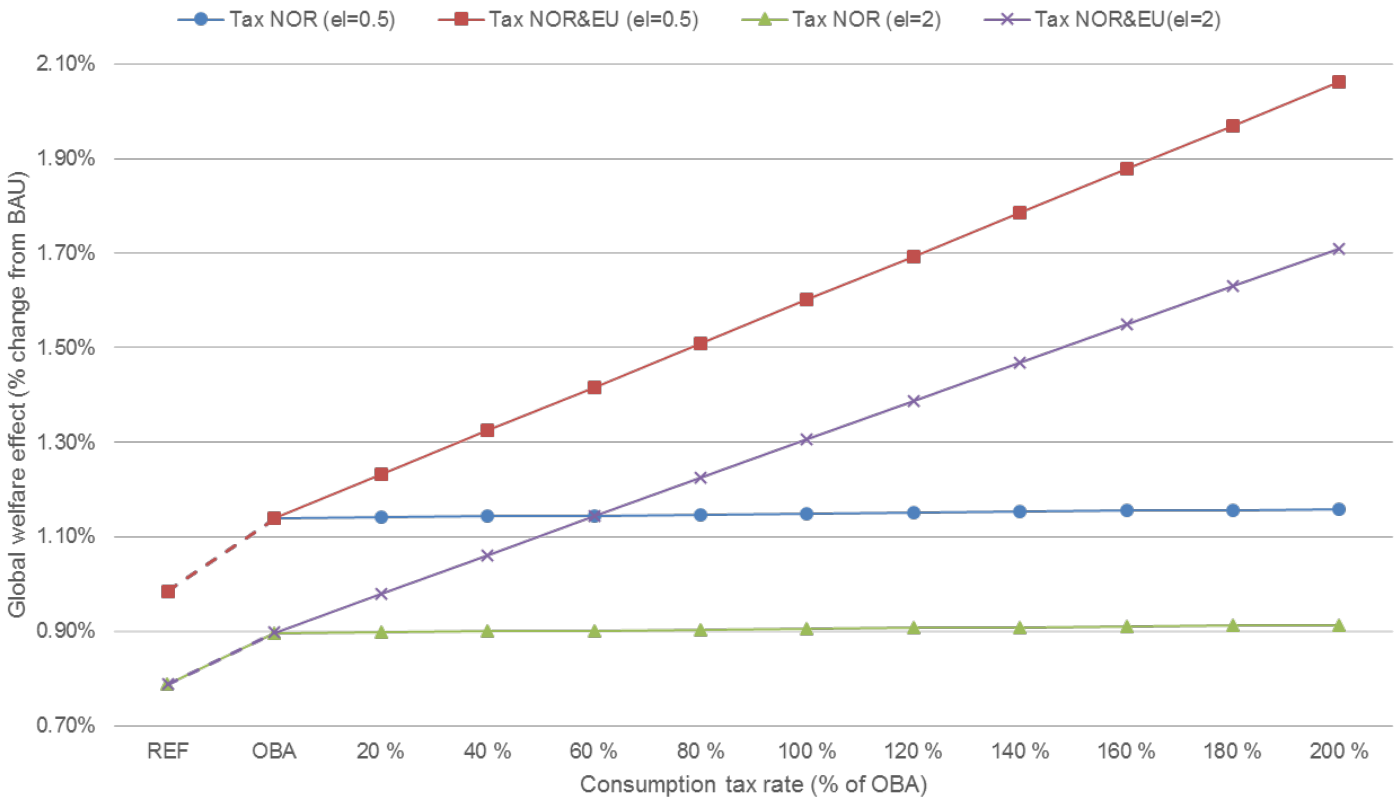
- **Regions NOR, EU and ROW:**
  - Producers of same goods across regions are homogenous:
    - emission-free and tradable
    - emission-intensive and trade-exposed, the sectors where OBA is considered (e.g. metal and other mineral production)
    - emission-intensive and non-tradable, where leakage is not of concern (e.g. electricity production and transport)
  - WIOD data (base-year 2009)
    - Emission reduction target at 20 percent of base-year emission for NOR and EU
    - Consumption tax introduced in NOR, a more stringent target
    - We use the standard calibration procedure in numerical simulation analysis, where base-year data information defines the fixed parameter values.

Welfare Effect in NOR



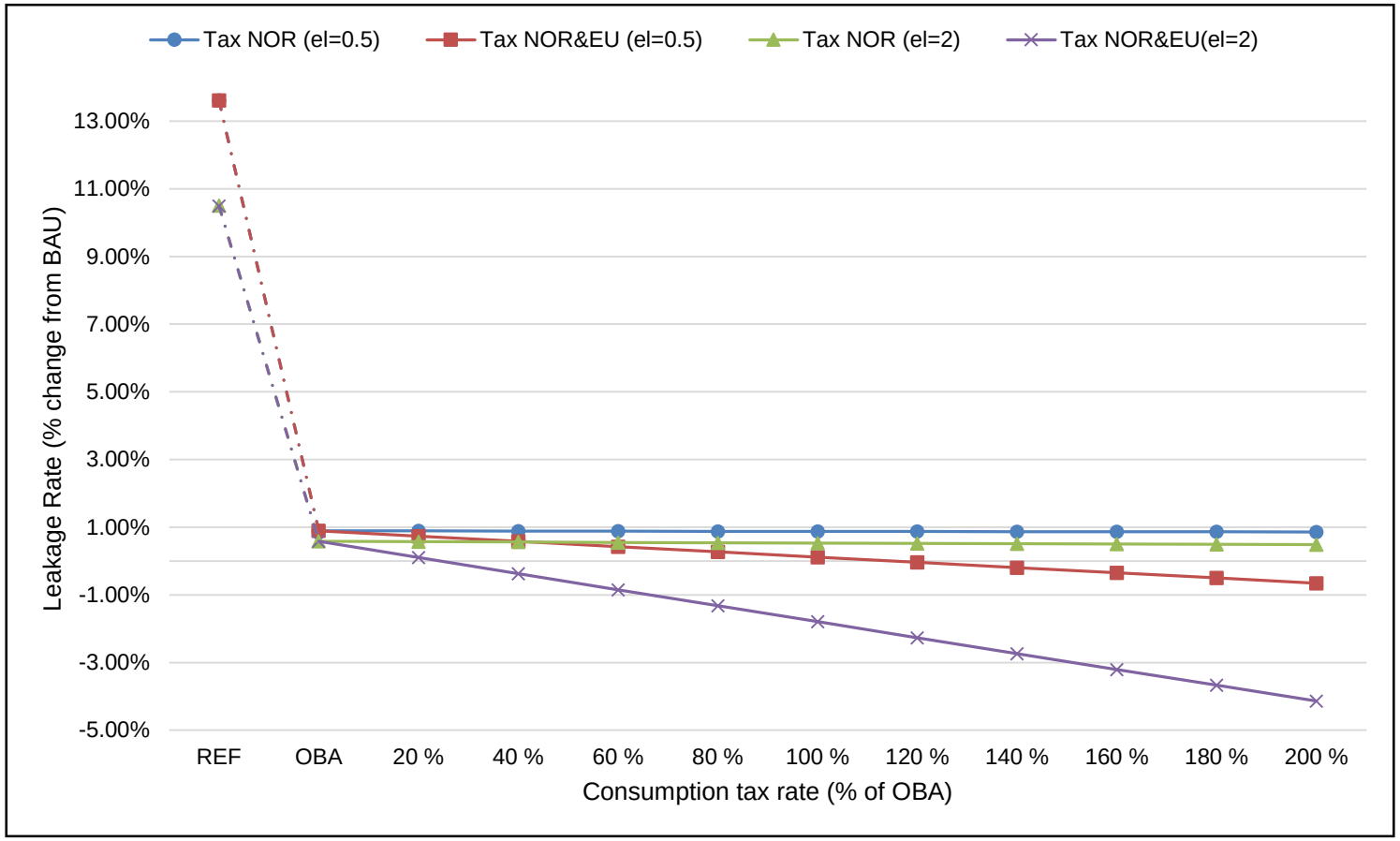
- The consumption tax w.r.t. subglobal welfare effect is unambiguously positive if:
  - the region is a net-importer of the Emission-Intensive and Trade-Exposed good.
  - joint emissions from sector y and z in region *i* are unchanged or increases
  - If either of these breaks, then it is unclear what that the regional welfare effect might be for region *i*

Global Welfare Effect



- The consumption tax in region *i* w.r.t to global welfare would be welfare improving when both region *i* and *j* have introduced an OBA-policy, and are part of the joint tradable emission market.
- We also find this when only region *i* has undertaken an environmental policy with OBA and introduces a consumption tax.

Numerical Simulation – Leakage Rate



Numerical Simulation – Welfare in other countries (Europe)

Country	Regional Welfare		
	REF	OBA	*OBA & 100% consumption tax*
Austria	*3 %*	*3 %*	*5 %*
Belgium	*3 %*	*4 %*	*5 %*
Bulgaria	*18 %*	*23 %*	*26 %*
Cyprus	*36 %*	*42 %*	*44 %*
Czech Republic	*8 %*	*9 %*	*11 %*
Germany	*2 %*	*3 %*	*5 %*
Denmark	*7 %*	*8 %*	*10 %*
Spain	*2 %*	*2 %*	*4 %*
Estonia	*49 %*	*56 %*	*58 %*
Finland	*6 %*	*7 %*	*8 %*
France	*1 %*	*1 %*	*3 %*
United Kingdom	*3 %*	*3 %*	*5 %*
Greece	*7 %*	*9 %*	*11 %*
Hungary	*9 %*	*11 %*	*13 %*
Ireland	*4 %*	*5 %*	*6 %*
Italy	*2 %*	*2%*	*4%*
Lithuania	*25 %*	*29 %*	*32 %*
Luxembourg	*10 %*	*12 %*	*13 %*
Latvia	*30 %*	*35 %*	*37 %*
Malta	*66 %*	*76 %*	*77 %*
Netherland	*3 %*	*4 %*	*5 %*
Norway	***3 %***	***4 %***	***6 %***
Poland	*9 %*	*10 %*	*12 %*
Portugal	*5 %*	*6 %*	*8 %*
Romania	*11 %*	*13 %*	*16 %*
Slovakia	*8 %*	*10 %*	*11 %*
Slovenia	*19 %*	*22 %*	*24 %*
Sweden	*3 %*	*4 %*	*5 %*

Concluding Remarks

- Theoretical analysis
  - Regional welfare improving effect under certain conditions
  - Global welfare effect is unambiguously positive
- Numerical simulation results
  - Positive welfare effect in Norway when introducing a consumption tax
    - Also if other EU/EEA countries introduce a consumption tax
  - Positive global welfare effect by introducing a consumption tax in EU/EEA countries
  - Reduced leakage rate and global emission

If the tax is set equal to the output-based allocation factors ("benchmarks"), the administrative cost of adding such a consumption tax will likely be limited (Neuhoff et al., 2016a; Ismer and Haussner, 2016). Böhringer et al. (2017) shows that the outcome of this combined policy will be equivalent to a certain variant of border carbon adjustments. Thus, combining output-based allocation with a consumption tax seems like a powerful policy strategy to mitigate carbon leakage, also for individual countries involved in a more extensive emission trading system

References

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